COMPLETE LISTING OF CLAIMS

1. (Currently amended) A method comprising accessing virtual iSCSI storage, including the steps of:

defining at least one physical logical unit number (LUN) on a physical storage device having an device IP address;

associating a unique TCP port number with each said at least one physical LUN;

replacing a first LUN identifier specified in said iSCSI command with a second LUN identifier associated with said given TCP port number;

establishing a unique IP address at which a virtual LUN is accessed from a host;

identifying a block TCP port number with each block range of said virtual LUN;

mapping a SCSI command to one or more iSCSI/TCP connections having said unique IP address and the block TCP port number identified with said each block range referenced by said SCSI command; and

substituting said unique IP address and said block TCP port number with said device IP address and said given TCP port number on packets between said host and said storage devices,

wherein said step of accessing results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

2. (Original) A method as recited in claim 1, further comprising forming a correspondence between an iSCSI command received on a given TCP port with a particular physical LUN associated with said given TCP port.

3. (Canceled)

4. (Original) A method as recited in claim 1, wherein the step of mapping includes converting a single SCSI command to one iSCSI connection per block range accessed.

5. (Original) A method as recited in claim 1, wherein the step of substituting includes looking up a local substitution map at a gateway having a mapping between incoming destination IP address and port number and an outgoing device IP address and port number.

6. (Original) A method as recited in claim 1, where a migration of a physical LUN from a source storage device to a target storage device requires only updating said substitution map to reflect new location of said physical LUN.

7. (Original) A method as recited in claim 1, further comprising:

employing IPSec processing support at the host;

employing IPSec processing support at a gateway between said host and said storage device; and

forming an IPSec tunnel between said host and said gateway;

10. (Currently amended) A method comprising providing support at a physical storage device for accessing virtual iSCSI storage, including the steps of:

defining at least one physical logical unit (LUN) on the physical storage device having an device IP address;

associating a unique TCP port number with each said at least one physical LUN; and

replacing a first LUN identifier specified in said iSCSI command with a second LUN identifier associated with said given TCP port number,

wherein said step of accessing results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

11. (Currently amended) A method comprising providing support at a host for accessing virtual iSCSI storage, including the steps of:

establishing a unique IP address at which a virtual LUN is accessed from the host;

identifying a block TCP port number with each block range of said virtual LUN; and

mapping a SCSI command to one or more iSCSI/TCP connections having said unique IP address and the block TCP port number identified with said each block range referenced by said SCSI command;

wherein said step of establishing results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

12. (Currently amended) A method comprising providing support at an intermediate gateway device between a host and a storage device for accessing virtual iSCSI storage, including the step of substituting a host-specified IP address and a host-specified TCP port number with a device IP

address and a TCP port number within that device according to a substitution table describing the virtual to physical storage mapping for incoming packets before forwarding said packets.

wherein said step of accessing results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

13. (Currently amended) An apparatus comprising:

a conversion module at a physical storage device for accessing virtual iSCSI storage, coupled to means for defining at least one physical logical unit (LUN) on the physical storage device having an device IP address; and coupled to means for associating a unique TCP port number with each said at least one physical LUN; said conversion module to replace a first LUN identifier specified in said iSCSI command with a second LUN identifier associated with said given TCP port number.

wherein said conversion module access results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

14. (Currently amended) An apparatus at a physical storage device for accessing virtual iSCSI storage, comprising:

means for replacing a first LUN identifier specified in an iSCSI command with a second LUN identifier associated with a given TCP port number included in said iSCSI command;

means for defining at least one physical logical unit (LUN) on the physical storage device having an device IP address; and

means for associating a unique TCP port number with each said at least one physical LUN,

wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

15. (Currently amended) An apparatus comprising a virtualization module at a host for accessing virtual iSCSI storage, said virtualization module includes:

means for establishing a unique IP address at which a virtual LUN is accessed from the host;

means for identifying a block TCP port number with each block range of said virtual LUN; and

means for mapping a SCSI command to one or more iSCSI/TCP connections having said unique IP address and the block TCP port number identified with said each block range referenced by said SCSI command,

wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

16. (Currently amended) An apparatus comprising a virtualization module at a host for accessing virtual iSCSI storage, said virtualization module includes:

a control module establishing a unique IP address at which a virtual LUN is accessed from the host, and for identifying a block TCP port number with each block range of said virtual LUN; and

a driver module for mapping a SCSI command to one or more iSCSI/TCP connections having said unique IP address and the block TCP port number identified with said each block range referenced by said SCSI command,

wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

17. (Currently amended) An apparatus comprising:

an address translation module at an intermediate gateway device between a host and a storage device for accessing virtual iSCSI storage, said address translation module having a substitution table describing a virtual to physical storage mapping, said address translation module to replace a host-specified IP address and a host-specified TCP port number with a device IP address and a TCP port number within said intermediate gateway device according to the substitution table for incoming packets before forwarding said incoming packets.

wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

18. (Currently amended) An apparatus comprising:

means for accessing, said apparatus being at an intermediate gateway device between a host and a storage device for accessing virtual iSCSI storage, said intermediate gateway device having a a substitution table, said substitution table describing a virtual to physical storage mapping of IP addresses and TCP port numbers; said apparatus comprising:

means for replacing a host-specified IP address and a host-specified TCP port number, with an IP address and a TCP port number of the storage device, within said intermediate gateway device, according to the substitution table for incoming packets before forwarding said incoming packets.

wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the host and one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate gateway between said host and said device.

19. (Original) An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing accessing virtual iSCSI storage,, the computer readable program code means in said article of manufacture comprising computer readable program code means for causing a computer to effect the steps of claim 1.

20. (Original) A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for accessing virtual iSCSI storage,, said method steps comprising the steps of claim 1..

21. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing LUN identifier substitution, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 13.

22. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing LUN identifier substitution, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 14.

23. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing SCSI command mapping, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 15.

24. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing SCSI command mapping, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 16.

25. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing address substitution, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 17.

26. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing address substitution, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 18.